CLAIMS

I claim:

1. A double stranded RNA (dsRNA) phage that expresses at least one genetic sequence in eukaryote cells, comprising:

a cap independent translation enhancer (CITE); and

at least one genetic sequence that is expressed in a eukaryote cell, wherein said CITE and said at least one genetic sequence are functionally linked and are incorporated into one or more dsRNA segments in the dsRNA.

2. The dsRNA phage of claim 1 wherein said at least one genetic sequence encodes a vaccine antigen.

3. The dsRNA phage of claim 1 wherein said at least one genetic sequence encodes a bioactive protein.

4. The dsRNA phage of claim 1 wherein said at least one genetic sequence encodes an immunoregulatory protein.

5. The dsRNA phage of claim 1 wherein said at least one genetic sequence encodes an antisense RNA.

6. The dsRNA phage of claim 1 wherein said at least one genetic sequence encodes a catalytic RNA.

7. The dsRNA phage of claim 1 wherein said at least one genetic sequence encodes an immunogen.

8. The dsRNA phage of claim 7 wherein said immunogen is viral.

9. The dsRNA phage of claim 7 wherein said immunogen is bacterial.

10. The dsRNA phage of claim 7 wherein said immunogen is parasitic.

11. The dsRNA phage of claim 7 wherein said immunogen is a therapeutic agent.

12. The dsRNA phage of claim 7 wherein said immunogen is an autoimmune antigen.

13. The dsRNA phage of claim 7 wherein said immunogen is a tumor antigen or tumor specific antigen.

14. The dsRNA phage of claim 1 wherein said CITE and said at least one genetic sequence are incorporated into an L segment.

15. The dsRNA phage of claim 1 wherein said CITE and said at least one genetic sequence are incorporated into an M segment.

16. The dsRNA phage of claim 1 wherein said CITE and said at least one genetic sequence are incorporated into an S segment.

17. The dsRNA phage of claim 1 wherein at said at least one genetic sequence includes a sequence encoding for green fluorescent protein.

18. The dsRNA phage of claim 1 wherein dsRNA is a prokaryotic virus.

19. The dsRNA phage of claim 1 wherein said at least one genetic sequence encodes an immunogen and a cytokine.

20. The dsRNA phage of claim 1 further comprising an alpha-virus self-amplifying expression system.

21. The dsRNA phage of claim 20 wherein said alpha-virus self-amplifying expression system is based on semliki forest virus.

22. A live bacterium comprising a double stranded RNA (dsRNA) phage that is transcribed and expresses at least one genetic sequence in eukaryote cells, wherein the dsRNA phage includes a cap independent translation enhancer (CITE), and at least one genetic sequence that is expressed in a eukaryote cell, wherein said CITE and said at least one genetic sequence are functionally linked and are incorporated into one or more dsRNA segments in the dsRNA.

23. A method for immunizing a subject comprising infecting said subject with a live bacterium comprising a double stranded RNA (dsRNA) phage that is transcribed and expresses at least one genetic sequence that yields at least one immunogen, wherein the dsRNA phage includes a cap independent translation enhancer (CITE), and at least one genetic sequence that expresses said immunogen in a eukaryote cell, wherein said CITE and said at least one genetic sequence are functionally linked and are incorporated into one or more dsRNA segments in the dsRNA.

24. The method of claim 23 wherein said immunogen is endogenous to said subject.

25. The method of claim 23 wherein said immunogen is foreign to said subject.

26. The method of claim 23 wherein said immunogen is viral.

27. The method of claim 23 wherein said immunogen is bacterial.

28. The method of claim 23 wherein said immunogen is parasitic.

29. The method of claim 23 wherein said at least one genetic sequence yields at least one cytokine.

30. A method of vaccinating an animal, comprising the steps of:

pulsing dendritic cells with a double stranded RNA (dsRNA) phage that expresses at least one genetic sequence in eukaryote cells, comprising a cap independent translation enhancer (CITE), and at least one genetic sequence that is expressed in a eukaryote cell, wherein said CITE and said at least one genetic sequence are functionally linked and are incorporated into one or more dsRNA segments in the dsRNA; and

injecting said dentritic cells into an animal.

31. A method of vaccinating an animal, comprising the step of providing the animal with a live attenuated bacterium harboring a double stranded RNA (dsRNA) phage that expresses at least one genetic sequence in eukaryote cells, comprising a cap independent translation enhancer (CITE), and at least one genetic sequence that is expressed in a eukaryote cell, wherein said CITE and said at least one genetic sequence are functionally linked and are incorporated into one or more dsRNA segments in the dsRNA.

32. The method of claim 31 wherein said providing step is performed orally.

33. The method of claim 31 wherein said providing step is performed by injection.

34. An anthrax vaccine, comprising:

a live bacterium harboring a double stranded RNA (dsRNA) phage that expresses at least one genetic sequence that expresses *Bacillus anthrax* lethal factor in eukaryote cells, said dsRNA includes in combination a cap independent translation enhancer (CITE), and at least one genetic sequence that expresses *Bacillus anthrax* lethal factor, wherein said CITE and said at least one genetic sequence are functionally linked and are incorporated into one or more dsRNA segments in the dsRNA.

35. The anthrax vaccine of claim 34 wherein said at least one genetic sequence is downstream of said CITE.

36. The anthrax vaccine of claim 34 further comprising an adjuvant.

37. A tuberculosis vaccine, comprising:

a live bacterium harboring a double stranded RNA (dsRNA) phage that expresses at least one genetic sequence that expresses a tuberculosis antigen in eukaryote cells, said dsRNA includes in combination a cap independent translation enhancer (CITE), and at least one genetic sequence that expresses a tuberculosis antigen, wherein said CITE and said at least one genetic sequence are functionally linked and are incorporated into one or more dsRNA segments in the dsRNA.

38. The anthrax vaccine of claim 37 wherein said at least one genetic sequence is downstream of said CITE.

39. The anthrax vaccine of claim 37 further comprising an adjuvant.